

CHAPTER 12 - VEGETATION

12.1 RESOURCE OVERVIEW

Based on geographic and climatic similarity, the State of Utah is divided into five major ecoregions. The BLM Moab Field Office (FO) occurs entirely within the Colorado Plateau ecological province. The unique climate and geology of the Colorado Plateau allow for the growth of many endemic and rare plant species and, thus, a significant degree of biodiversity. The variety of elevations and precipitation zones within the Moab FO area only enhances the area's biodiversity.

Despite the inherent ecological and aesthetic value of its biodiversity, the vegetation resource in the Moab FO area is primarily managed for livestock, wildlife, and fire management under the Grand Resource Area RMP (the current RMP; BLM 1985). Today, vegetation management must also consider issues such as soil stabilization, soil nutrient cycles, watershed health, vegetation's aesthetic role in the landscape, and the potential ramifications of a loss of vegetation productivity in a sustained drought.

12.1.1 Dominant Vegetation Communities

The following broad ecological zones, based on precipitation and the dominant vegetation species, were identified in the current RMP (BLM 1985). For management purposes, these zones are further classified into more specific vegetation communities. The distribution of these communities is primarily influenced by soil type, elevation, precipitation, and topography, but also by land management activities such as livestock and wildlife grazing, road and minerals development, and ATV use. Additionally, in the last 5-6 years, vegetation communities have been highly impacted by drought conditions. See Figure 12-1 for the distribution of vegetation across the planning area.

12.1.1.1 Salt Desert Shrub Zone

This zone receives relatively low annual precipitation (5 to 10 inches), which results in very little soil moisture available for plant growth. Elevations range from 4,000 to 5,400 feet. Soils are often very saline or alkaline and vary in moisture availability, from drier, well-drained areas to areas where the water table is near the surface (MacMahon 1988). Thirty-three plant communities have been recognized in this zone, indicated by the dominant species: shadscale, greasewood, blackbrush, fourwing saltbush, nuttall saltbush, mat saltbush, buckwheat, spiny hopsage, salina wildrye, and other perennial grasses. These communities are generally associated with mancos-derived clay soils, which are extremely susceptible to wind and water erosion following surface disturbances.

12.1.1.2 Pinyon-Juniper Zone

These woodlands, dominated by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), generally grow at elevations between 4,700 and 8,600 feet and where precipitation totals 12 to 18 inches per year. The supporting landscape varies in topography from level to steep slopes (0 percent to 80 percent) and includes more than 15 plant communities. Dominant plant

species are pinyon, juniper, salina wildrye, Mormon tea, and black sagebrush. Pinyon dominates the overstory as stands reach the upper elevational range, whereas juniper dominates at lower elevations. As elevation increases within this zone, stand structure changes from open overstory with a sparsely vegetated understory to more dense with a greater variety of species. Land treatments followed by crested wheatgrass seedings have historically occurred within this community type and are considered altered ecological sites.

12.1.1.3 Sagebrush Zone

The landscapes that support this zone are relatively more conducive to plant growth, with moderately deep soils and precipitation totaling 11 to 16 inches per year. Elevation ranges from 5,500 to 7,300 feet with little localized relief. Big sagebrush and Wyoming sagebrush dominate the seven community types identified in this zone. Elevation and soil depth influence the species composition and density, which may include horsebrush, rabbitbrush, hopsage, saltbush, Mormon tea, and winterfat (MacMahon 1988).

Land treatments followed by crested wheatgrass seedings have historically occurred within this community type, and are considered altered ecological sites. Significant percentages of sagebrush have also been converted to monotypic stands of exotic cheatgrass or tumbleweed (*Salsola*) as a result of wildfires, drought, and grazing. Appropriate revegetation methods can be effective in restoring diverse community compositions in this zone, but large-scale rehabilitation has yet to be implemented successfully within the Moab FO area (see San Arroyo Study Plot, BLM 1997).

12.1.1.4 Douglas-fir Zone

This zone's annual precipitation ranges from 14 to 25 inches. Elevations range from 6,000 to 9,000 feet, and slopes are often extremely steep. The soils, more fertile than those in other zones, support six plant communities dominated by species such as mountain sagebrush, manzanita, Douglas-fir, and gamble oak. Due to the extreme slopes and often rocky terrain, these community types are generally managed for wildlife habitat. (Grand County Soil Survey, NRCS 1981).

12.1.1.5 Riparian/Wetlands Zone

Riparian areas contain vegetation associated with surface or subsurface moisture. Riparian areas include wetlands, which require prolonged saturation of soils and contain certain vegetative species dependent upon soil saturation. Less than 1 percent of the Moab FO area is riparian; these areas are located along major rivers, drainages, or spring sites. More detailed information concerning riparian resources can be found in Chapter 11, Riparian, of this AMS.

The remaining land of the Moab FO area is considered rock outcrop/badlands.

Vegetation across the Moab FO area has been identified using Utah Gap Analysis data (Edwards et al. 1996). Gap vegetation data were developed using multispectral satellite imagery in conjunction with image processing and classification software. The relationship between spectral signatures and a given vegetation type was further refined via development of models that incorporated a variety of topographic and distributional information for that given vegetation

type. Utah Gap Analysis vegetation data were intended to be used for depicting the distribution of the state's various vegetation types at scales of 1:100,000 or smaller. While adequate for characterizing vegetation over large areas, this data is less accurate when viewed for smaller project areas. Utah Gap Analysis data indicate the following cover types and acreages in the Moab FO area (Table 12-1).

Table 12-1. Gap Cover Types and Acreages in the Moab FO Area			
Cover Type	Acre	Cover Type	Acre
Spruce-fir, fir/shrub	32,939	Alpine	3,014
Ponderosa pine, ponderosa pine/ mountain shrub	31,487	Barren	6,233
Juniper, pinyon-juniper, pinyon	841,077	Desert Shrub (salt desert scrub, grass- land, blackbrush, greasewood)	1,302,389
Aspen, aspen-conifer	53,490	Riparian	4,948
Oak/mountain shrub	310,673	Agriculture	6,133
Sagebrush/sagebrush perennial grass	248,461	Urban	4,153
Grassland	1,848	Water	8,508

12.1.2 Special Status Species

For BLM management purposes, special status species include plant species listed as endangered, threatened, proposed, and/or candidate under the Endangered Species Act, as well as those plant species listed as sensitive in the State of Utah by the BLM. Periodic review of the special status species list allows for additions and/or removals depending on the status of populations, habitats, and potential threats. The current BLM special status species list was updated in August 2002 (see Table 12A-1, Appendix).

Of the fifteen special status species known to occur in the planning area (Table 12A-1, Appendix) one federally listed threatened plant species, *Cycladenia humilis* var. *jonesii* (Jones cycladenia), has been identified as occurring in Grand County, Utah, near lower Castle Valley. Jones cycladenia grows on barren slopes of the Moenkopi Formation in gypsiferous soils.

12.1.3 Invasive Species and Noxious Weeds

The BLM defines noxious weeds as "a plant that interferes with management objectives for a given area of land at a given point in time." Noxious weeds are defined in *Rangeland Health Standards and Guidelines* (BLM 1997) as non-native plants that are especially undesirable because they have no forage value and are sometimes toxic, or are capable of invading plant communities and displacing native species. The BLM recognizes noxious weed invasions as one of the greatest threats to the health of rangelands nationwide.

Invasive species include plants able to establish on a site where they were not present in the original plant composition. Invasive species aggressively out-compete native species within a community and often alter the physical and biotic components enough to affect the entire

ecological community. Invasive species are of particular concern following a disturbance. They are often exotic species that do not have naturally occurring, local predators.

Noxious and invasive species have been identified by county for the State of Utah. Knapweed, tamarisk, and Russian olive are all problematic species occurring in riparian areas of the Moab FO area. Tamarisk channelizes rivers with its deep roots and chokes out other vegetation. Purple loostrike has also been documented throughout the Colorado River system, from Westwater to Potash (Personal communication with Daryl Trotter, BLM, and field notes from site visit, December 2-6, 2002). Those species of management concern for the Moab FO area are included in Table 12A-2 of the Appendix.

12.2 SPECIFIC MANDATES AND AUTHORITY

- Taylor Grazing Act of 1970, as amended – Protects rangelands and soils from effects of overgrazing while providing rangelands for managed use and improvement. It also supports the livestock industry dependent on public lands.
- Endangered Species Act of 1973 – In general, protects endangered species and their habitat. This act is also used as a basis for eradicating non-native invasive species that threaten endangered species.
- Federal Noxious Weed Act of 1974 – Authorizes measures to eradicate or control the spread of noxious weeds.
- Federal Land Policy and Management Act of 1976 – Directs managers to determine areas suitable for livestock grazing under the multiple use, sustained yield mandate.
- Public Rangelands Improvement Act of 1978 – Provides policy to manage, maintain, and improve public rangelands to increase productivity while remaining consistent with management objectives.
- Plant Protection Act of 2000 – Consolidates and modernizes all major statutes pertaining to plant protection and quarantine (e.g., Federal Noxious Weed Act, Plant Quarantine Act).
- Executive Order 11987 – Restricts exotic species introductions by federal agencies and allows for their introduction under specific circumstances.
- Executive Order 13112 – Established National Invasive Species Council in 1999 and outlines steps to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause.
- BLM Manual Section 6840 – Agency-specific guidelines regarding special status species management.
- BLM *Standards for Rangeland Health and Guidelines for Livestock Management* (BLM 1997) – Sets standards for healthy upland soils, riparian and wetland areas, desired species compositions, and water quality.
- *Vegetation Treatment on BLM Lands in Thirteen Western States FEIS* (BLM 1991) and Record of Decision (ROD) for Utah (BLM 1991) – Assesses potential impacts from various methods of vegetation treatments, including burning, biological, mechanical, manual, and chemical, and directs the implementation of an integrated vegetation

treatment program. The Utah ROD further prioritizes management actions for BLM-administered lands in Utah. This FEIS provides the required NEPA compliance for assessing impacts from the treatment of undesirable species. The necessity of treatment is to be determined by BLM land use plans.

- Utah Seed Act (Utah Code, Title 4, Chapter 16) – Provides guidelines for the labeling and distribution of seeds, in conjunction with Seed Law (Rule R68-8), which prohibits the sale and distribution of noxious weed seeds.
- Utah Noxious Weed Act, as amended (Utah Code, Title 3 Chapter 17) – Authorizes measures to eradicate or control the spread of noxious weeds.
- Utah Noxious Weed Act (Rule R68-9) – Designates State of Utah noxious weeds and sources capable of weed dissemination.
- Middle Colorado River Watershed Cooperative Weed Management Area – A cooperative agreement for the Middle Colorado River Watershed Cooperative Weed Management Area (CWMA), signed in 2003. It partners several federal and state agencies with local county governments to facilitate weed management responsibilities. Partners in the agreement include the USFS, Manti-La Sal National Forest; the BLM, Moab and Vernal Field Offices, Utah, and the Grand Junction and Craig Field Offices, Colorado; the NPS, Arches and Canyonlands National Parks, and Colorado and Dinosaur National Monuments; the USFWS, Grand Junction, Colorado; the Utah SITLA and the Utah DOT; the Colorado DOT and Colorado Division of Wildlife and Forestry; the Bureau of Indian Affairs; and the counties of Grand and Uintah, Utah, and Rio Blanco, Moffat, and Mesa, Colorado.

12.3 CURRENT MANAGEMENT PRACTICES

12.3.1 Practices Under Various Directives

12.3.1.1 Vegetation Treatment on BLM Lands in Thirteen Western States FEIS

The following vegetation management priorities are outlined in the *Vegetation Treatment on BLM Lands in Thirteen Western States FEIS* (BLM 1991) and the Utah ROD (BLM 1991).

1. Take actions to prevent or minimize the need for vegetation control when and where feasible, considering the management objectives for the site.
2. Use effective, nonchemical methods of vegetation control when and where feasible.
3. Use herbicides after considering the effectiveness of all potential methods or in combination with other methods of control. Chemicals could be used where the benefits would meet or exceed those of other control methods. The application of chemicals shall meet or exceed BLM and label requirements.

The ROD (BLM 1991) maintains the state's flexibility to use all available vegetation management tools within an integrated management program, including biological control (e.g., insects, pathogens, and domestic animals), prescribed burning, mechanical and manual practices, chemical control, and preventive actions to avoid or minimize environmental harm resulting from implementation of practices. Vegetation management objectives specific to the area are to be used as a guide in choosing treatment methods. The potential environmental impacts,

treatment effectiveness, human health and safety, cost, project longevity, and available technology are also to be considered.

The Utah ROD estimated that an average of 28,450 acres would be treated annually in the state. Approximately 57 percent would be treated with chemicals or prescribed burning initially, unless technology provided new and effective alternative methods (BLM 1991).

12.3.1.2 The 1985 Grand Resource Area RMP

The planning process for the 1985 Grand RMP included planning criteria for vegetation within livestock and range management plans, wildlife habitat management plans, and fire management plans. The current RMP (BLM 1985) manages vegetation primarily from a forage, habitat, and fire management standpoint and does not necessarily consider other factors such as the role of vegetation in soil stability and erosion, moisture retention, nutrient cycling, or recreational and visual/aesthetic values.

The RMP states that forage production should balance with the physiological requirements of plant species to produce a sustainable grazing system. Livestock management decisions involve allotments and AUMs, season of use, and potential vegetation treatments to improve forage. For wildlife, management is similar to that for livestock, but concerns vegetation productivity with respect to wildlife habitat.

12.3.1.3 Utah's Standards for Rangeland Health

Further vegetation management guidance is provided by Utah's Standards for Rangeland Health, Standard 3. Desired species, including native, threatened, endangered, and special status species, are maintained at a level appropriate for the site and species involved. This standard is indicated by:

1. Frequency, diversity, density, age class, and productivity of desired native species necessary to ensure reproductive capability and survival.
2. Habitats connected at a level to enhance species survival.
3. Native species re-occupy habitat niches and voids caused by disturbances unless management objectives call for introduction or maintenance of non-native species.
4. Habitats for threatened, endangered, and special status species managed to provide for recovery and move species toward de-listing.
5. Appropriate amount, type, and distribution of vegetation reflecting the presence of 1) Desired Plant Community (DPC), where identified in a land use plan conforming to these Standards, or 2) where the DPC is not identified, a community that sustains the desired level of productivity and properly functioning ecological processes.

12.3.1.4 Moab Field Office Fire Management Plan

Vegetation projects under the fire management program aim to improve or maintain the condition of the vegetation and prevent the accumulation of fuels. The fire management program follows the Moab Field Office Fire Management Plan (1998). Vegetation resource management goals are linked to fire suppression efforts under a limited suppression policy. The plan allows

the use of wildfire and prescribed fire in low-risk areas where livestock forage, wildlife habitat, and watershed resources would improve with fire. For example, dense pinyon-juniper and sagebrush communities with little topographic relief are allowed to burn under controlled conditions.

Vegetative inventories based on ecological sites and using a Soil Vegetative Inventory Method or SVIM were performed from 1980 through 1981 to determine forage allocations for livestock and wildlife numbers. However, this data was never incorporated into BLM management. General ecological condition was collected by allotment during the inventory and is referenced in the current RMP by seral category (see BLM 1985:Appendix D).

The current RMP uses selective management categories to prioritize vegetation management by range allotment. Of the 67 allotments in the Moab FO area, 7 are category M (maintain), indicating they are generally in good condition with no major management conflicts. Ecological conditions were to be maintained on 32,000 acres, where mineral withdrawals are planned or underway (BLM 1985). The majority of allotments (50) are category I (improve), indicating range condition is unsatisfactory, productivity is low, or resource conflicts exist. Ecological conditions were to be improved through grazing restrictions placed on 27,000 acres of saline soils and over 3 miles of perennial streams (BLM 1985). The third category, C (custodial), indicates areas with low productivity potential. More information concerning grazing conditions is found in Chapter 7 of this AMS.

For the current RMP (BLM 1985), Gap Analysis data was unavailable for certain portions of the Moab FO area; in these places, grazing levels were established as the average number of animals authorized over the previous five years (1977-1982). According to recent analysis of historical weather and proxy data (such as tree rings, pollen samples, and pack rat middens), this 1977-1982 period coincided with one of the wettest climate cycles in the twentieth century (Hereford et al. 2002 and BLM precipitation records), and livestock authorization records indicated a 40-65% average use level. While this 5-year period does incorporate the worst single drought year on local record (1977), the remaining years received concurrent, record high precipitation. This resulted in a short-term inflation in the amount of available forage, reflected as a difference in stocking rates of nearly 20,000 total livestock AUMs (1,600 animals) between drought and high precipitation years. More specifically, this allowed for sheep herds to double in size following the drought (BLM Draft 1983 Grand RMP: Figure 3-1).

To-date, approximately half of the livestock adjustments established in the 1985 RMP have not been implemented, with significant deviations in livestock stocking rates occurring in some allotments. At these inflated stocking levels, the landscape cannot sustain a diverse and healthy ecosystem in the present nor foreseeable future.

12.3.2 Rangeland Improvement

Projects involving invasive species and noxious weed eradication, fuels reduction, wildlife habitat improvement, and forage production all employ methods to treat vegetation. Manipulating vegetation can create or restore a particular plant community composition and structure. All general vegetation treatment projects tier to the Vegetation EIS (BLM 1991), which analyzed impacts and decided which treatment methods would be used on BLM-

administered lands. Land treatments to improve vegetation, wildlife, and watershed resources include mechanical (chaining, plowing, cutting, drill seeding, and prescribed fire), chemical, and biological methods. Re-seeding practices and seed mixtures are site-specific and include a variety of species to benefit livestock and wildlife needs. The current RMP restricts livestock grazing in seeded areas for two growing seasons (BLM 1985).

Monitoring rangeland condition through trend and utilization studies, livestock use records, and climate observations were indicated in the current RMP as planned to occur on an ongoing basis (BLM 1985).

Several community types were identified in the RMP (BLM 1985) to exhibit good treatment/restoration potential, based on annual precipitation, soil type, average annual vegetation production (lbs/acre), slope, and existing vegetation potential for wildlife, livestock, and watershed benefit. These include some types of riparian, sagebrush, pinyon-juniper, grassland, and oak communities. In general, salt desert shrub communities and other water-deficient communities are difficult to improve.

To date, 18 treatment projects have occurred in the pinyon-juniper woodlands of the Moab FO area. Approximately 28,000 acres have been treated (Jackson 2004).

12.3.3 Invasive Species and Noxious Weeds

A series of Best Management Practices (BMPs) have been developed within the Moab FO area to reduce the spread of invasive and noxious species. Policies for all federal land management agencies, as well as Rangeland Health Standards and Guidelines require the use of certified weed-free hay when operating on public lands to control the spread of noxious weeds. Other management practices aimed to reduce weed infestations include power-washing all ground-disturbing equipment. For revegetation purposes, the use and perpetuation of native species is a priority, except in instances when non-intrusive, non-native species are more ecologically or economically feasible. Authorization of livestock grazing during seed-setting of noxious weeds, such as Russian knapweed, should be avoided to alleviate the spread.

Herbicide spraying follows BLM Manual 9220 and must meet Environmental Protection Agency pollution standards. Aerial applications are subject to wind restrictions. Agricultural and water locations are to be identified and avoided. An annual Pesticide Use Permit (PUP) is required to be kept on file in each office to record herbicide use and application details.

A large burned area along the Colorado River is receiving experimental rehabilitation treatments to eliminate tamarisk regrowth. Experimental use of the "Bull Hog," a mulching machine, precedes chemical treatment of Tordon. Hand-application equipment is used to control the spray, keeping 10 feet from the river edge. The area will then be re-seeded.

Russian Olive treatments have occurred in Millcreek Canyon, as per the TMDL requirement for exotic removal.

Several restoration projects involving noxious and invasive species have been initiated within the Moab FO area. These often involve restoration of riparian areas where noxious Russian knapweed and exotic tamarisk or Russian olive are severely altering native communities. Project

areas by river include: Colorado River (Goose Island, campgrounds), Dolores River (Roberts Bottom, Gateway), Green River (Point Bottom), Mill Creek, Negro Bill, Kane Creek Springs, Ten Mile, and Seven Mile. See Chapter 11, Riparian Resources, for further discussion of riparian restoration projects.

12.3.4 Wildlife Habitat Improvement

Habitat management plans (HMPs) in the Moab FO area include the Cisco Desert, Hatch Point, Potash-Confluence, and Dolores Triangle HMPs. In addition, two RMP amendments, EA #UT-068-89-036 and EA #UT-068-94-047, are in place to improve wildlife habitat. Livestock grazing allotments are also managed for wildlife forage production. Wildlife habitat improvement plans and allotment management plans are discussed in detail in Chapters 16 and 7 of this AMS, respectively.

12.3.5 Fuels Reductions

Details on specific fire management projects are included in Chapter 4 of this AMS. Vegetation treatments specific to fire management objectives include prescribed burning, mechanical (chaining, mulching, brush removal), and chemical. Fuels reduction projects often also meet vegetation management objectives by improving ecological conditions for increased plant growth.

12.3.6 Special Status Species

As required by law, the BLM must manage for special status plant species growing on public lands. BLM protocol for special status species protection begins with habitat evaluation of the proposed project area. If the combination of existing environmental characteristics such as geology, soils, vegetation community, elevation, and aspect is likely to support special status species, a qualified specialist must survey for the potentially occurring species. If performed by a contractor, a BLM specialist must approve the results.

A Biological Evaluation is prepared if a federal- or BLM-listed species could be affected by a proposed action. The BLM must manage federally listed species to prevent further habitat degradation or population loss. For BLM sensitive species, determination of impacts to individuals, populations, or habitat is based on whether the proposed action would lead to federal listing. Consultation with the USFWS occurs if the species in question is one under their consideration. If the proposed action is found to not result in impacts to federally listed, proposed, or candidate species, a "no affect" determination is indicated and further USFWS consultation is not necessary.

Special status species are often protected by recovery plans, if needed, or by special management area designations and special management conditions. Standards and Guidelines for Healthy Rangelands (BLM 1997) also provide habitat protection through proper rangeland management.

In addition to special area designations, special management conditions protect vegetation if the affected areas also include habitat for special status species. Locations that include floodplains and riparian or aquatic areas, sensitive soils and slopes, areas of seasonal wildlife importance,

National Register cultural properties and archaeologic districts, and areas with special recreation designations may indirectly protect special status plant species.

12.4 RESOURCE DEMAND AND ANALYSIS

Demands on vegetation must balance between the needs of wildlife and livestock, the need for a viable vegetative soil cover to reduce surface erosion, and the need to maintain viable native plant populations to prevent further establishment of invasive species. Drought conditions over the past 5 years continue to greatly affect vegetation productivity from year to year. Native vegetation is severely stressed, with an alarming rate of mortality occurring, especially in the shrub communities. Nearly every major shrub species is experiencing die-offs, including sagebrush, blackbrush, Mormon tea, greasewood, and rabbitbrush. There is also an alarming rate of conversion of native perennial grasses to invasive annual species such as cheatgrass, halogeton, and Russian thistle. Up to date baseline vegetation inventory data in conjunction with on-going monitoring is necessary for accurate range and wildlife management decisions. Without this type of accurate information, allocation of vegetation will be significantly flawed.

Considering historic precipitation data and the current drought conditions, BLM must recognize effects of short-term and prolonged drought on forage allocations for livestock and wildlife, and the sustainability of multiple-use values pertaining to vegetation and ecological communities.

Increases in surface disturbing activities of all types have become the greatest threats to vegetation communities and special status species in the Moab FO area. Crucial habitats are impacted by ground disturbing activities. In addition to crushing and uprooting vegetation, particularly in and adjacent to riparian areas, this disturbance when combined with the lack of precipitation then causes soil to erode from blowing winds, covering vegetation in adjacent areas. In addition, humans and domesticated animals further disperse weed seeds.

Invasive species, such as tamarisk and Russian knapweed threaten native vegetation communities in the Moab FO area. Altered successional trends, evidenced as pinyon and juniper encroachment and decadent sagebrush stands continue in the Moab FO area.

12.5 CONSISTENCY WITH NON-BUREAU PLANS

A number of other federal, state, and local agencies have management jurisdiction of lands adjacent to public lands within the Moab FO area, therefore; coordinated management is required.

As stated in the Manti-La Sal National Forest Record of Decision (USFS 1986), vegetation may be treated to disrupt succession for the benefit of resources such as recreation, range, wildlife, watershed, and timber management. Vegetation type changes include aspen/fir to aspen, pinyon-juniper to grassland, sagebrush to forb-grass, and grass to tall forb. Silvicultural methods include selective tree removal and shelterwood harvests. Aspen and pinyon-juniper may be treated in areas exceeding 40 acres. Riparian areas are managed for protection and enhancement. The adjacent Manti-La Sal National Forest has the administrative responsibility to protect federally listed and USFS Region 4 sensitive species. Management is guided by USFS sensitive species policy in Forest Service Manual 2670. The Regional Forester must identify sensitive species, defined as those species for which population viability is a concern based on known populations

and habitat conditions, and manage them to prevent the need for further protection under federal listing. According to Forest Service Manual Title 2600, the Regional Forester examines the following sources as possible candidates for listing as sensitive species: U.S. Fish and Wildlife Service species of concern and candidates for federal listing, State databases of endangered, threatened, rare, endemic, unique, or vanishing species, and other sources as appropriate.

The Manti division of the Manti-LaSal National Forest primarily manages noxious weeds on the National Forest Lands adjacent to the BLM Moab FO area. Weed control occurs through cooperation with the counties, focusing on Musk thistle, Whitetop, and Canada thistle. Other problematic species identified include Dyers woad, Toadflax, and Russian knapweed.

The NPS sensitive species policy is guided by Guideline No.NPS-77, Ch. 2. The two nearby National Parks, Arches and Canyonlands, manage to protect the same federally listed and other special status species as identified for the BLM Moab FO. Invasive weed control is also addressed in the National Parks under an integrated pest management program, which employs more than one eradication technique, with herbicides used as a final option.

The Grand County General Plan Update (Four Corners Planning 2004) acknowledges the fact that 66 percent of the county is managed by the BLM. In Section 4.2.6 of the Grand County Plan, policies are established to promote public land management for the citizens of Grand County and the nation. Public Lands Policy 12 encourages federal conservation of unaltered vegetation areas, and the designation of these areas as areas of critical environmental concern or Research Natural Areas.

As mentioned, Grand County is a partner in the co-operative agreement for the Middle Colorado River Watershed Cooperative Weed Management Area.

San Juan County contracts with the BLM for the control of invasive species and noxious weeds.

State law defines sovereign lands as "those lands lying below the ordinary high water mark of navigable bodies of water at the date of statehood and owned by the state by virtue of its sovereignty" (FFSL 2001). State ownership extends to the land and vegetative resources below the 100-year high water mark. This ruling affects management actions such as restoration projects in those segments designated as navigable in the Colorado River and Green River corridors.

According to the Utah Division of Water Resources, Total Maximum Daily Load water quality reports recommend restoration of riparian corridors with respect to exotic and invasive vegetative management to improve riparian systems.

12.6 ISSUES OR CONCERNS

In general, vegetation management issues are linked to other resource management programs and are also addressed therein. The riparian and woodland components of vegetation resources require unique management direction and are discussed in Chapters 11 and 18, respectively. Ecological condition monitoring conducted for livestock and wildlife management purposes, which incorporate forage utilization and trend studies, provide managers with valuable vegetation data.

The maintenance of existing native plant populations and vegetation communities is threatened by the current extended drought and ongoing surface disturbance management authorizations. Management actions must allow for mitigation of the loss of some of these communities and/or the invasion of these communities by weeds. If the drought persists for the length of time many of the experts are predicting, the vegetative resource will clearly be unable to maintain present levels of livestock and wildlife grazing.

Up to date baseline vegetation inventory and monitoring data is necessary for accurate range, wildlife, and watershed management decisions. Climactic conditions, such as drought, should be considered when performing these inventories and making assessments of vegetative productivity. Without this detailed information, allocation and management of vegetative communities is significantly flawed and the sustainability of multiple-use ecological resources is at risk. Nearly 20 years after the current RMP, approximately half of the livestock adjustments established in the 1985 RMP have not been implemented, with significant deviations in livestock stocking rates occurring in some allotments. Current stocking levels were determined during the wettest period on record, and vegetative monitoring currently employed does not provide proper data for making multiple-use resource management decisions. Adjustments in livestock management including changes in season-of use, reductions in livestock numbers, and patterns of grazing use (rotation) appear to be indicated by current ecological condition. In general, those allotments once dominated by moderate ecological condition (1983 Draft Grand RMP: Appendix I) are those areas currently of ecological concern.

Unrestricted surface disturbances have widespread impacts on vegetation. Surface disturbances have degraded critical habitat of special status species and may reduce population viability and species distributions. OHV use is also adding significantly to an increasing public health and safety issue associated with dust. The removal of vegetation from off-road recreation leaves soil with little ability to withstand wind storms. The resulting sand and clay particles quickly move along the ground and into the atmosphere, respectively, resulting in the potential for dangerous and deadly multiple car pile ups along major transportation corridors, exacerbation of respiratory related illness, and loss of valuable, nutrient rich topsoil.

Controlling species such as Russian knapweed, tamarisk, and Russian olive must be a priority along river banks and adjacent campgrounds. OHVs and commercial horse use potentially contribute to the spread of noxious and invasive weeds through lack of education/enforcement of BMPs. In addition to the tamarisk and Russian olive encroachment along the river corridors, we are continuing to see major areas of uplands and rangelands being converted to invasive annual grasses such as cheatgrass, halogeton, and Russian thistle.

Maintaining or improving the quality of special ecological communities is an issue under current management. While vegetative conditions within communities may be static, species diversity, watershed condition, and wildlife values are not being adequately protected. Current Bureau guidance encourages conservation of multiple-use, diverse, and sensitive ecological communities including riparian areas, sagebrush conservation for recovery of sage-grouse habitat, and relict ecological communities (salt desert shrub communities, perennial grasslands, blackbrush, premier wetlands).

12.7 MANAGEMENT OPPORTUNITIES AND LIMITATIONS

Special designations could be established to provide additional resource protection to rare, unique, or sensitive resources. ACECs currently proposed could provide some protection to special status plants and their habitats. The Upper Courthouse ACEC would protect two BLM sensitive species and their habitat, some small riparian areas, and relict plant communities isolated on mesa tops. Behind the Rocks ACEC would protect five BLM sensitive species and their habitat, relict plant communities, and some riparian areas. Professor Valley ACEC would protect one federally listed threatened plant species, two BLM sensitive species, and essential vegetation of the Colorado River corridor. The Ten Mile Wash ACEC would protect sensitive riparian and wetland resources, as well as maintaining associated cultural, wildlife, recreational, and scenic resources.

Designating Weed Management Areas (WMAs) would better direct efforts of the noxious weed control program. Treatments within WMAs would require comprehensive resource coordination to meet objectives, incorporate proper methods, and implement mitigation.

Additional management opportunities exist to try to maintain native vegetation during the drought. Management decisions that would eliminate or reduce surface disturbance would help maintain some of the native vegetative integrity. Decisions would involve seasonal or year-round closures to ATVs in critical areas, changing seasons of use for livestock grazing and reducing numbers of livestock, limiting commercial activities associated with energy development to existing roads and trails, and requiring enhanced reclamation and remediation of right-of-way construction and maintenance projects.

Limitations to management will clearly be impacted by the length and severity of the current drought. If the drought persists, the success of any reclamation or restoration projects will be severely curtailed. Additional limitations are imposed by our lack of current baseline conditions and lack of data showing distribution of invasive species and major shrub die off areas.

Lack of adequate monitoring data and vegetative inventories are limiting the capability to understand ecological trends and impacts within the Moab FO area. Data from previous soils and vegetation inventories could be made useable and transferred into electronic form. This could assist ground truthing of large-scale Gap data and long-term ecological monitoring projects. New data inventory efforts could also be conducted. Available vegetation data could potentially be joined with other ecological data for a landscape-scale approach to land-use planning and resource conservation. Implementing a planning tool such as Ecoregional Planning, developed by The Nature Conservancy, would accomplish this by identifying and prioritizing areas of high conservation potential and managing a portion of these areas for biodiversity values (TNC 2002).

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VEGETATION APPENDIX

Table 12A-1. Special Status Plant Species with the Potential to Occur in the Moab FO Area, Grand and San Juan Counties, Utah			
Scientific Name Common Name	Habitat	Status (w/date if only on one list for San Juan Co.)	Area of Potential and/or Known Occurrence
<i>Cycladenia humilis</i> var. <i>jonesii</i> <i>Jones cycladenia</i>	Gypsiferous or saline soils on the Chinle, Cutler, and Summerville Formations. Barren slopes of the Moenkopi Formation. Mid-May to June. 4,400-6,000'.	Threatened	Grand County. Endemic.
<i>Astragalus pubentissimus</i> var. <i>peabodianus</i> <i>Peabody's milkvetch</i>	Entrenched channels of escarpments draining south and west flanks of Tavaputs Plateaus. Pinyon-Juniper and mixed desert shrub. 1300-1770 m.	Sensitive	Grand County (type from Thompson Spring). Endemic.
<i>Astragalus sabulosus</i> var. <i>sabulosus</i> <i>Cisco milkvetch</i>	Salt desert shrub in Mancos Shale Formation in Grand River Valley (Cisco desert). Selenophyte. April. 4,260-5,250.	Sensitive	Grand County (Thompson east to Cisco Mesa.). Endemic.
<i>Astragalus sabulosus</i> var. <i>vehiculus</i> <i>Stage-station milkvetch</i>	Salt desert shrub in Morrison Formation. Selenophyte. April. 4500'. Considered geographically isolated from var. <i>sabulosus</i> .	Sensitive	Grand County. Endemic (Upper Courthouse Wash).
<i>Gilia latifolia</i> var. <i>imperialis</i> Cataract Canyon <i>gilia</i>	Shadscale and other mixed desert shrub communities. 3,800-5,215'.	Sensitive (2002)	San Juan County (type from Cataract Canyon). Utah Endemic.
<i>Habenaria zothecina</i> Alcove bog orchid	Moist streambanks, seeps, hanging gardens, in mixed desert shrub, piñon-juniper, and oakbrush. Late July-Aug. 4,360-8,690'.	Sensitive (2002)	San Juan County, Grand County (type). Utah endemic.
<i>Lomatium latilobum</i> Canyonlands <i>lomatium</i> (C. biscuitroot, or C. desert-parsley)	Sandy soil or crevices in Entrada sandstone. Slot canyons. (Found in Navajo sandstone that weathers like Entrada in Sand Flat and Mill Creek.) Prefers the sheltered, cool habitat on all slopes and aspects. April-June. 4,800-6,855'.	Sensitive	San Juan County, Grand County (Wilson Mesa) Southeastern Utah (and adj. Mesa County Colorado) endemic. 13 occurrences.
<i>Lygodesmia</i> [grandiflora var.] <i>doloresensis</i> Dolores rushpink	Reddish alluvial soil, juniper-grassland. June. 4,500-4,700'.	Sensitive	Grand County.

Table 12A-1. Special Status Plant Species with the Potential to Occur in the Moab FO Area, Grand and San Juan Counties, Utah			
Scientific Name Common Name	Habitat	Status (w/date if only on one list for San Juan Co.)	Area of Potential and/or Known Occurrence
<i>Lygodesmia [grandiflora var.] entrada</i> Entrada rushpink (or skeletonweed)	Juniper, mixed desert shrub communities. June. 4,400- 4,800'.	Sensitive	Grand County (also Emery Co.). Endemic. Type from Courthouse Wash.
<i>Mentzelia shultziorum</i> Shultz' stickleaf (or blazing star)	Shadscale, eriogonum, ephedra communities in Cutler Formation. Moderate to very steep slopes of Paradox and Moenkopi Formations. Silty clay loam or silty loam	Sensitive	Grand County (type along Onion Creek). Seven known populations southeast of Colorado River. Endemic to Fisher, Professor, and Castle Valley.
<i>Oreoxis trotteri</i> Trotter's oreoxis (spring- parsley)	Mixed juniper and warm desert shrub. Slickrock, or Main Body Entrada sandstone on eastern slope of Courthouse Rock and Navajo sandstone below on flats. Most abundant on Moab Tongue white sandstone of Entrada. Late April-mid-June. 4,750- 5,000'.	Sensitive	Grand County (type Courthouse Rock, northwest of Moab). Endemic.
<i>Pediomelum aromaticum</i> <i>var. tuhyi</i> Paradox breadroot (or Tuhy Aromatic Scurf- pea?)	Pinyon-juniper and mixed desert shrub. 5,020'.	Sensitive (2002)	San Juan County.
<i>Perityle specuicola</i> Alcove rock-daisy	Drier crevices in seasonally wet hanging gardens, and alcove communities. Navajo and Windgate sandstone and Rico Formation, but not substrate specific. Mid- July-late Sept. 3,690- 4,000'.	Sensitive	San Juan County, Grand County (type north of Moab). Narrowly endemic to Colorado Plateau (from confluence of Colorado River with the Dolores and Dark Canyon.
<i>Sphaeralcea janeae</i> (or <i>S. leptophylla var.</i> <i>janeae</i>) Jane's Globemallow	Sandy soils of weathered white rim and Organ Rock members of Cutler Formation. Warm and salt desert shrub. 1220-1405 m.	Sensitive (2002)	San Juan County (type near White Rim road), Grand County (questionable). Canyonlands endemic.

Table 12A-1. Special Status Plant Species with the Potential to Occur in the Moab FO Area, Grand and San Juan Counties, Utah			
Scientific Name Common Name	Habitat	Status (w/date if only on one list for San Juan Co.)	Area of Potential and/or Known Occurrence
Sphaeralcea psoraloides <i>San Rafael globemallow</i>	Eastern and southeastern footslopes of the Swell. Saline and gypsiferous substrates. Zuckin-ephedra communities of Entrada siltstone. Mid-May-June. 4,000-6,000'.	Sensitive	Grand County Endemic to San Rafael Swell (Wayne and Emery Counties).
Sources: Draft BLM Sensitive Plant Species List for Utah August 2002 Utah Endangered, Threatened, and Sensitive Plant Field Guide Atwood et al. 1991.			

Table 12A-2. Noxious and Invasive Species of Grand County, Utah	
Common Name	Scientific Name
Bermudagrass	<i>Cynodon dactylon</i>
Bindweed	<i>Convolvulus spp.</i>
Black henbane	<i>Hysocyamus niger</i>
Buffalobur	<i>Sloanea rostratum</i>
Camelthorn	<i>Alhagi camelorum</i>
Canada Thistle	<i>Cirsium arvense</i>
Dalmation toadflax	<i>Linaria dalmatica</i>
Diffuse Knapweed	<i>Centaurea diffusa</i>
Dyer's Woad	<i>Isatis tinctoria</i>
Goatsrue	<i>Galega officinalis</i>
Houndstongue	<i>Hyoscyamus niger</i>
Jointed goatgrass	<i>Aegilops cylindrica</i>
Johnson Grass	<i>Sorghum halepense</i>
Perennial Sorghum	<i>Sorghum almum</i>
Leafy Spurge	<i>Euphorbia esula</i>
Medusahead	<i>Taeniatherum caput-medusae</i>
Musk Thistle	<i>Carduus nutans</i>
Poison hemlock	<i>Conium maculatum</i>
Perennial Pepperweed/Whitetop	<i>Lepidium latifolium</i>
Puncturevine	<i>Tribullus terrestris</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Purple starthistle	<i>Centaurea calcitrapa</i>
Quackgrass	<i>Elytrigia repens</i>

Table 12A-2. Noxious and Invasive Species of Grand County, Utah	
Common Name	Scientific Name
Russian Knapweed	<i>Centarea repens</i>
Russian Olive	<i>Elaeagnus angustifolia</i>
Scotch Thistle	<i>Onopordium acanthium</i>
Silverleaf nightshade	<i>Solanum elaeagnifolium</i>
Spotted Knapweed	<i>Centaurea maculosa</i>
Squarrose Knapweed	<i>Centaurea squarrosa</i>
St. John's wort	<i>Hypericum perforatum</i>
Velvetleaf	<i>Abutilon theophrasti</i>
Water hemlock	<i>Cicuta douglasii</i>
Whitetop/Hoary cress	<i>Cardaria spp.</i>
Wild proso millet	<i>Panicum miliaceum</i>
Whorled milkweed	<i>Asclepias subverticillata</i>
Yellow nutsedge	<i>Cyperus esculentus</i>
Yellow toadflax	<i>Linaria vulgaris</i>
Yellow Starthistle	<i>Centaurea solstitialis</i>